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A systematic study of dust and star formation in early-type galaxies with AKARI

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With the AKARI all-sky maps, we conduct a systematic study of dust and star formation for the 260 local early-type galaxies (ETGs) from the ATLAS3D survey, for which cold (HI and CO) and hot (X-ray) gas measurements are available. We detected far-infrared dust emission in 30% of the ETGs, where the dust emission is not correlated with the stellar emission, indicating that dust in those galaxies is of interstellar origin. In addition, polycyclic aromatic hydrocarbons (PAHs) are detected in many ETGs, suggesting that ETGs still form stars. We modeled the spectral energy distributions of the sample ETGs to derive the dust and PAH luminosities, from which we estimated the dust masses and star formation rates (SFRs), respectively. The dust-to-stellar mass ratios and current SFRs of the ETGs are lower than those of late-type galaxies (LTGs), showing that ETGs are quiescent galaxies, while their current star formation efficiencies are similar to those of LTGs. Our results indicate that the low SFRs of ETGs are likely due to their smaller cold gas fractions rather than a suppression of star formation. We also find that the dust masses and X-ray luminosities are correlated in fast-rotating ETGs, which appears to be caused by their higher current star formation activity than slow-rotating ETGs.

Consider for a poster?

Yes

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